

IN THE CLAIMS:

1. (Currently Amended) A method for extracting visemes from an audio speech signal, comprising:

receiving successive frames of digitized analog speech information obtained from the audio speech signal at a fixed rate;

filtering each of the successive frames of digitized analog speech information to synchronously generate time domain frame classification vectors at the fixed rate, wherein each of the time domain frame classification vectors is derived from one of the successive frames of digitized analog speech information; and

synchronously generating a sequence of a set of visemes wherein each set of visemes in the sequence is derived from a corresponding one of the time domain frame classification vectors, and thereby from a corresponding one of the successive frames of digitized analog speech information. ~~analyzing each of the time domain classification vectors to synchronously generate a set of visemes corresponding to each of the successive frames of digitized speech information at the fixed rate.~~

2. (Currently Amended) The method for extracting visemes from an audio speech signal according to claim 1, wherein in the step of analyzing, each set of visemes is generated with a latency less than 100 milliseconds with reference to a successive frame of digitized analog speech information with which the set of visemes corresponds.

3. (Currently Amended) The method for extracting visemes from an audio speech signal according to claim 2, wherein the latency is less than 10 milliseconds.

4. (Currently Amended) The method for extracting visemes from an audio speech signal according to claim 1, wherein each set of visemes includes a subset of visemes identifiers and a one to one corresponding subset of confidence numbers.

5. (Currently Amended) The method for extracting visemes from an audio speech signal according to claim 1, wherein the set of visemes consists of an identity of one most likely viseme.

6. (Currently Amended) The method for extracting visemes from an audio speech signal according to claim 1, wherein the step of filtering comprises:

converting each of the successive frames of digitized analog speech information to a spectral domain vector using N multi-taper discrete prolate spheroid sequence basis (MTDPSSB) functions that are factors of a Fredholm integral of the first kind; and
converting each spectral domain vector to one of the time domain frame classification vectors using Inverse Discrete Cosine Transformation, wherein N is a positive integer.

7. (Currently Amended) The method for extracting visemes from an audio speech signal according to claim 6, wherein the conversion of each of the successive frames of digitized analog speech information to a spectral domain vector comprises:

multiplying a successive frame of digitized analog speech information by one of the N MTDPSSB functions to generate N product sets of the successive frame of digitized analog speech information;

performing a fast Fourier transform (FFT) of each of the N product sets to generate N FFT sets of the successive frame of digitized analog speech information; and

combining together the N FFT sets of the successive frame of digitized analog speech information to generate a summed FFT set of the successive frame of digitized analog speech information.

8. (Currently Amended) The method for extracting visemes from an audio speech signal according to claim 7, wherein the conversion of each of the successive frames of digitized analog speech information to a spectral domain vector further comprises scaling the summed FFT set of the successive frame of digitized analog speech information.

9. (Currently Amended) The method for extracting visemes from an audio speech signal according to claim 1, wherein the step of analyzing comprises a spatial classification.

10. (Currently Amended) The method for extracting visemes from an audio speech signal according to claim 1, wherein the step of analyzing is performed by one of a neural network and a fuzzy logic function.

11. (Currently Amended) The method for extracting visemes from an audio speech signal according to claim 10 claim 9, wherein the neural network is a feed-forward memory-less perceptron type neural classifier.

12. (Currently Amended) An apparatus for extracting visemes from an audio speech signal, comprising:

at least one processor; and

at least one memory that stores programmed instructions that control the at least one processor to

receive successive frames of digitized analog speech information from the audio speech signal at a fixed rate,

filter each of the successive frames of digitized analog speech information to synchronously generate time domain frame classification vectors at the fixed rate, wherein each of the time domain frame classification vectors is derived from one of the successive frames of digitized analog speech information, and

synchronously generate a sequence of a set of visemes wherein each set of visemes in the sequence is derived from a corresponding one of the time domain frame classification vectors, and thereby from a corresponding one of the successive frames of digitized analog speech information analyze each of the time domain classification vectors to synchronously generate a set of visemes corresponding to each of the successive frames of digitized speech information at the fixed rate.

13. (Currently Amended) A speech receiving device, comprising:

at least one processor;

at least one memory that stores programmed instructions that control the at least one processor to

receive successive frames of digitized analog speech information from an audio speech signal at a fixed rate,

filter each of the successive frames of digitized analog speech information to synchronously generate time domain frame classification vectors at the fixed rate, wherein each of the time domain frame classification vectors is derived from one of the successive frames of digitized analog speech information, and

synchronously generate a sequence of a set of visemes wherein each set of visemes in the sequence is derived from a corresponding one of the time domain frame classification vectors, and thereby from a corresponding one of the successive frames of digitized analog speech information analyze each of the time domain classification vectors to synchronously generate a set of visemes corresponding to each of the successive frames of digitized speech information at the fixed rate; and

a display that displays an avatar that is formed using the set of visemes.

14. (Currently Amended) An apparatus for extracting visemes from an audio speech signal, comprising:

means for receiving successive frames of digitized analog speech information from the audio speech signal at a fixed rate,

means for filtering each of the successive frames of digitized analog speech information to synchronously generate time domain frame classification vectors at the fixed rate, wherein each of the time domain frame classification vectors is derived from one of the successive frames of digitized analog speech information, and

means for synchronously generating a sequence of a set of visemes wherein each set of visemes in the sequence is derived from a corresponding one of the time domain frame classification vectors, and thereby from a corresponding one of the successive frames of digitized analog speech information analyzing each of the time domain classification vectors to synchronously generate a set of visemes corresponding to each of the successive frames of digitized speech information at the fixed rate.

15. (New) The method for extracting visemes from an audio speech signal according to claim 1, wherein in the step of conversion, N is 5 or less and wherein in the step of analyzing, each set of visemes is generated with a latency less than 10 milliseconds with reference to a successive frame of digitized analog speech information with which the set of visemes corresponds.